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FORMERLY WILLOW RUN LABORATORIES, THE UNIVERSITY OF MICHIGAN

P. O. BOX 618 • ANN ARBOR • MICHIGAN • 48107

PHONE (313) 483-0500

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20 November 1974

Study of Recreational Land and Open Space
Using SKYLAB Imagery
Monthly Progress Report, October 1974

(E75-10034) STUDY OF RECREATIONAL LAND

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Prepared by

Irvin J. Sattinger - Principal Investigator

NASA Technical Monitor

Mr. R. E. Joosten/TF6
National Aeronautics and Space Administration
Johnson Space Center
Principal Investigator Management Office
Houston, Texas 77058

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RECREATIONAL LAND ANALYSIS

Current Activities

In anticipation of the receipt of SL-3 digital tapes for the SL-3 pass over Southeast Michigan on 5 August 1973, detailed planning for the analysis of the digital data is proceeding. Skylab S190A and S190B photography and the screening film for the S192 data obtained on 5 August 1973 have been studied to select the specific areas for which the scanner digital data are to be analyzed. Two areas which have previously received intensive study under the ERTS-1 and other programs and for which extensive ground truth are available were clear of cloud cover during the SL-3 pass. These are (1) an area which includes Springfield and White Lake Townships in the northwest section of Oakland County, and (2) an area containing Unadilla and Putnam Townships in Livingston County and Lyndon and Dexter Townships in Washtenaw County.

The second area is of particular interest for recreational analysis because its topography, vegetation, hydrology, and land use make it of potentially significant value as deer habitat or waterfowl habitat. The analysis of the S192 data for this area will therefore concentrate on those land cover and land use types which can be used to assess its rating as wildlife habitat. As preliminary steps toward this assessment process, abundance and distribution of these features in the study area have been analyzed using high-altitude aircraft data.

Future Work

The next task to be conducted in the investigation of S192 data will be to perform recognition processing of the selected area to prepare a map of the abundance and distribution of water, vegetation, and land use types which determine the value of the area as wildlife habitat. The results of this initial computer processing will be assessed with respect to several factors: (1) the increased performance of 13-channel space-acquired data, as compared to scanner data covering only the visible and near-infrared portions of the spectrum, (2) the ultimate performance of single-date recognition mapping using a single date of coverage, and (3) the estimated improvement of performance which may be expected from computer processing of S192 data for more than one date.



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SNOW AND ICE HYDROLOGY

Objectives

Observation and measurement of snow and ice cover are potentially important applications of earth resource survey systems, because of their potential scientific and economic value in large-scale hydrologic studies.

Snow and ice cover, for example, are primary requisites for winter recreation potential; and thus are economically important in Michigan and throughout the Midwest. To investigate the usefulness of space-acquired data for monitoring and analyzing snow and ice hydrologic features, additional funding is being provided under this contract to investigate the potential contribution of Skylab 190A photography and S192 scanner video imagery for these purposes.

ERTS data have been shown to be useful for snow cover surveys and hydrologic modelling inputs, especially in conjunction with limited ground truth data (Carlson, Kane, and Wendler, 1973; Meier, 1973; Barnes and Bowley, 1973). In addition, Bryan (1974) has examined the spectral characteristics of different snow cover and lake ice types for ERTS spectral bands. This evokes two specific questions about Skylab data potential. (1) Does Skylab imagery (photography and scanner data) illustrate the same general spectral reflective characteristics for snow and ice features as does ERTS? (2) What additional information does Skylab provide? The second question logically focuses on the thermal scanner capability present on Skylab 192, but not on ERTS.

Current Activities

Skylab SL4 Pass 41 (January 25, 1974) was selected for analysis because of (1) the mid-winter date, (2) apparent variations in ground snowcover, (3) cloudless sky conditions, and (4) availability of thermal scanner data taken with the improved resolution X-5 sensor. The portion of the pass utilized extends from just west of LaCrosse, Wisconsin to Fort Wayne, Indiana.

The following data and imagery have been acquired.

(1) Daily mean temperature, temperature at three-hour intervals, precipitation and snowcover data from the National Climatic Center, Asheville, North Carolina. Detailed data are available only for LaCrosse, Madison, South Bend, and Fort Wayne weather stations.

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(2) Coast Guard ice charts for southern Lake Michigan were obtained from the Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan. It was found that southern Lake Michigan was essentially ice-free on January 25,

(3) All multispectral S190A photography for the pass area was obtained from the Johnson Space Center,

(4) Three S192 scanner video imagery strips were on hand at ERIM as screening film. The bands available covered spectral regions comparable to ERTS plus a thermal band (.654-.734 μm , 1.03-1.19 μm , and 10.2-12.5 μm). Extra positive and negative transparency copies of these were made for analysis purposes,

Preliminary interpretation of the S190A photography indicates that snow and ice feature spectral responses generally vary in agreement with Bryan's results. This will be elaborated on in the final report,

Thermal scanner video imagery has proven difficult to interpret. Snow surfaces were all near 0°C because of a sudden January thaw. This resulted in reduced contrast among features on the video imagery. Despite the unfavorable temperature conditions, it is possible to differentiate degrees of snow cover (spatial) and various combinations of snow and ice on frozen inland lakes. Finally, the thermal band readily indicates whether the snow pack surface is wet by means of the apparent temperature. This is an indirect indication of surface weather and trafficability conditions.

Future Work


The thermal and red band scanner video imagery are now being examined by photodensitometer traces in order to enhance subtle variations and patterns. Final analysis and summarization of the possible Skylab contribution to Midwestern snow and ice hydrology will be completed in the next report period.

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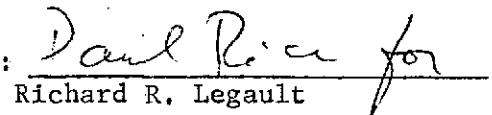
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Submitted:


Irvin J. Sattinger
Principal Investigator

Approved by:


Richard R. Legault
Director
Infrared & Optics Division